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Mastoid Cases

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MASTOID CASES.

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The attention which has been given to the question of operation in cases of mastoid disease and the increase of the literature on this subject, especially during the past ten years, are evidences both of its importance and of the proper recognition thereof. Whatever may be the difference of opinion among writers as to the method of effecting the simple purpose in hand, all seem to agree that whatever the difficulty of the operation itself may be, they are less than is the judicious solving of the question as to the limit between simple anti-phlogistic measures and the need of surgical interference. The history of long lists of fatal results following mastoid disease not operated upon, on the one hand, and the steadily augmenting reports of successful results in operative cases, on the other, are growing arguments in favor of surgical treatment in the early stages of inflammation of the mastoid cells.

When we consider that the initial inflammation occurs, in the majority of cases, in that portion of the mastoid cavity most remote from its outer surface and nearest to the brain, and that carefully prepared sections of innumerable temporal bones show that in by far the larger number this region is made up of minute cells with thin and easily destructible bony walls covered with highly vascular membrane, the blood supply of which is in more or less direct communication with that of the cranial cavity, the argument in favor of forestalling the effort of nature, which involves the often slow extension of the inflammatory process outward, is very much strengthened.

The efficacy of the Wilde's incision as a purely anti-phlogistic measure has led to its being depended upon in many cases where it should have been but the first step in a mastoid operation; indeed, there are cases, not by any means common, it is true, in which the drilling of the mastoid, under proper antiseptic precautions of course, has seemed to be the only measure which would sufficiently meet the demand for a considerable and rapid depletion, and has been of the greatest service. In my own experience with the use of leeches and cold applications as preliminaries, I find it a good rule never to make a Wilde's incision, so called, without both expecting and being prepared to go further.

A review of recent publications on the subject of artificial perforation of the mastoid process, and the inspection of any of our large aural clinics having interchangeable services, show considerable differences of opinion among surgeons as to the indications for and the method of procedure in the mastoid operation, and the extent to which interference should be carried.

Setting aside these minutiæ and viewing the operation from the standpoint of a simple surgical procedure, it may be said to be called for under the following conditions: Firstly, as a means of phlebotomy; secondly, to check an inflammatory process in the mastoid and ward off its possible serious results; or, thirdly, to remove the consequences of the inflammatory process in the form of retained pus and necrotic bone.

In the first of these three instances, the operation need be carried only far enough to secure free depletion; in the two latter instances, it will have failed of its true purpose as a surgical procedure unless the removal of the diseased parts is made as thorough and as complete as is consistent with the immediate safety of the patient, it being by no means overlooked that while this region bears very

hazardous relations to other important parts, recent experience has shown that their invasion is by no means so serious or possibly fatal a matter as was at one time supposed.

With the present community of knowledge in all scientific matters, one of the great values of personal experience is its use for purposes of comparison, since, where the general course of procedure in any given direction may be the same, the minor opinions as to methods are often greatly increased in value when subjected to comparison and discussion.

The ordinary routine of pratice includes many experiences which would be very valuable for reference and comparison, were they more clearly defined, and this is an argument in favor of and an excuse for those detailed reports of cases which sometimes seem burdensome,— especially so if they have been selected and set aside for the illustration of some particular point; but it is the daily practical experience, including both success and failure, which is most valuable for purposes of criticism.

This is, in one sense, the reason for presenting the thirty consecutive cases of mastoid disease which have come under my personal care during the present year, twenty-three of which required operation.

In reference to the general course of procedure in the operative cases, it may be briefly stated that all the operations, with one exception, were done under ether and that in all of them the simplest antiseptic precautions were observed, the mastoid region being first shaved carefully, then scrubbed thoroughly and douched with hot water, and the hairy portion of the scalp covered with tightly stretched rubber tissue.

The instruments which would probably be required during the operation, and which preferably had been previously boiled in soda solution, were placed in a shallow, cloth-

covered tray and submerged in a 1 to 20 carbolic solution one-half hour before the operation, when possible; these instruments consisted of scalpels, one with a very slender, narrow blade; one-half dozen or more of ordinary nippers; two broad curved retractors; large sized Bowman probes; a fine steel probe; a curved steel explorer; hand drills, three sizes, three, four, and six millimeters wide respectively; gouge-shaped chisels; and large, medium, and small sharp spoons; other instruments which might, in addition, be possibly required were placed in a similar tray. Just before the operation, these trays, with the instruments, were flushed with boiling water; boiling water was also poured into the irrigator used for flushing during and for final douching after the operation, and into a bowl containing previously boiled and carbolized sponges. The hands of the surgeon and his assistants were thoroughly cleansed, and the neck and shoulders of the patient, and portions of the bed or table with which the instruments might come in contact, were covered with moist antiseptic towels.

The incision was always intended to be a little larger than might ordinarily be required for working purposes, was made with as few strokes as possible to secure clean surfaces, and its lower end was cut upon the slant, to favor subsequent drainage. Hemorrhage from the flaps was ordinarily controlled by means of nippers and sponging with very hot water, and by the use of the broad, smooth retractors, which were used also to expose the bone freely in order that its surface, in default of any special indication of disease, might be carefully searched by means of the explorer and fine probes for the purpose of determining, if possible, the existence of any small sinus which might otherwise escape detection.

The first opening into the bone, when this was still imperforate, was usually made by means of the smallest

hand drill, enlarged by the larger drills, and then further extended by means of the gouge and chisel, the chiselling being done preferably with a small light mallet striking short frequent blows, cutting done in this manner being rapid and with the least shock to the parts.

Within the mastoid cavity the operation was continued, so far as possible, solely by means of sharp spoons, the drill and the chisel being used to supplement them only, and the curetting being continued in whatever direction might be indicated as a general rule, until the diseased bone was entirely removed; in three of the cases hereafter reported the removal of a portion of the inner wall, and in one, of almost the entire mastoid, being necessary.[1]

At the conclusion of the operation, which had been when needed and, therefore, in a great majority of cases, immediately preceded by incision of the membrana tympani, the wound and the ear were thoroughly douched with warm water, an effort being made to secure a free passage through the antrum, except in certain of the acute cases with very considerable swelling of the mucous membrane in that region, previous experience having shown in some of such cases that recovery was more rapid without this interference.

The ear itself was carefully dried, plugged with a pledget of cotton or baked gauze, and baked gauze dressings applied over the mastoid region and the ear, in some few cases corrosive being used instead of the baked gauze; in no case were drainage tubes or gauze introduced into the wound, and no stitches were used. Twenty-four hours after the operation, unless previously required, the wound was reopened and explored by means of a probe and syringed with weak corrosive or, preferably, weak per-

[1]The handles of all the instruments used are preferably of metal, smooth finished, and with a smooth gouged or undulated surface in place of the usual serrations, the maker's name even being omitted.

manganate solution, subsequent drainage being insured sufficiently in all cases by the daily probing, the wound being allowed to close from within and above as rapidly as possible, care being taken to preserve, however, by use of the probe at the daily dressing, a sufficient external opening to permit of free drainage and to allow the use of the curette, should any smaller spiculæ of bone, detached subsequently to the operation and detected by the probing, require removal. With the cases thoroughly curetted, this was rarely necessary.

The best results as to time of recovery, including complete healing of the wound to the surface, were, of the twenty-three cases, one in six, one in seven, one in nine, one in eleven, and three in thirteen days after the operation.[1]

Case I.—Boy, six months of age, was first seen Jan. 15th, 1891, on account of suppurative otitis media, with free discharge and with some redness behind both ears. Ordered syringing with weak bicarbonate solution. (Child nursed well and was well nourished.) Jan. 19th, redness and swelling had both disappeared, and the discharge had decreased. Jan. 22d, post-aural swelling on both sides had returned, with fluctuation and increase of muco-purulent discharge, and operation was evidently necessary and was done without ether. An incision was made one-half

[1] There are two points in the cases here reported, to which attention may be directed. First, the location and character of the preliminary incision in the membrana tympani; free, following the curve of the periphery from the short process, very nearly backward, and affording not only free drainage but an opportunity to carry the incision within the tympanum upward and backward to the antrum, through the thickened reduplications which have been shown to exist in the great majority of cases, and, second, the free use of sharp spoons made with a considerable convexity and a long anterior lip, the handles of the spoons being gouged on the side toward the cutting edge of the spoon, and smooth finished.

inch behind each ear with free discharge of pus; bare and crumbling bone was found to the full limit of the incision on the right side, while on the left side there was a comparatively small surface of bone of the same character. In both instances, the diseased bone was thoroughly removed by means of the sharp spoon, and weak corrosive sublimate solution was syringed from the meatus to the wound behind the ear in both directions.

The subsequent treatment consisted in syringing the ears and wounds until the latter began to close in with firm granulation tissue. Recovery was slow, both wounds having closed at the end of two months. After the first three days the permanganate solution was substituted in syringing and dressing, and the syringing was omitted and a probe only used daily, after the appearance of laudable pus, with other evidences that the wound was healing from the bottom. General treatment consisted in administration of small quantities of iodide of iron and, later, of cod liver oil emulsion.

Case II.—Woman, single, 25 years of age, slender, fair complexion, well nourished, and in good health until a little more than a year ago, when she had nervous prostration in a mild degree, recovered, and relapsed a year later. On December 26th, the patient was attacked by a severe pain in the left ear, following a very hard cold contracted in the latter part of November. This pain had continued with periods of spontaneous relief until recently, when it had increased and extended to the mastoid, the left side of her head, the left eye, and had made sleep without opiates impossible. The diagnosis being inflammation of the middle ear of slow progress, and periostitis with mastoid complications, operation was done under ether on Jan. 31st, 1891. The membrana tympani was first incised, with free bleeding but no purulent discharge. An incision was

then made about an inch and a half long, three-fourths of an inch behind the line of junction of the external ear and the surface of the mastoid process. By means of the drill, chisel, and gouge, the mastoid process was perforated and curetted along the line indicated by inflamed bone, but no pus was found until the antrum was reached; the wound was then syringed out with a solution of corrosive sublimate, 1 to 1,000, and an antiseptic poultice was placed over the whole mastoid region.

The subsequent dressing and care of this case was under direction of Dr. Van Hoosen of the New England Hospital for Women, where the operation was done, the ear was douched twice daily and the wound once daily. Several small sloughs were removed in this way, though comparatively little pus was seen. The patient had no pain in the mastoid region or head after the operation, slept well without opiates, and made a complete recovery in seven days.

Case III.—Woman, 26 years, single, slender, and well nourished. Was first seen March 3d, 1891, with recurrence of old suppuration of the left middle ear, with very considerable swelling of the mucous membrane of the tympanum and with mastoid tenderness. A free incision in the posterior portion of the membrana tympani was followed a few days later by hernia of the mucous membrane, resembling a hard mucous polyp. This was snared with considerable relief to the sense of fullness in the head, and lessening of the mastoid tenderness. Temperature, 98.4°. March 12th. The relief afforded by the use of the snare continued until last night, when the pain in and behind the ear recurred with much increase of mastoid tenderness, the opening in the drumhead remaining free.

March 13. Operation. Vertical incision over the centre of mastoid, bone of cortex clear and hard but oozing freely under drill, no pus found until the small drill had been passed well in towards the antrum, upward and for-

ward; after enlarging the opening in the cortex by means of the chisel, the sharp spoon was freely used until all apparently affected bone had been removed. Syringing from wound through the antrum was impeded by the considerable swelling of the mucous membrane at that point and was not, therefore, persisted in. On the following day, the patient was entirely free from pain, and had slept well. The temperature, which had been 100° at the time of the operation, was normal, and the appetite was good, the discharge from the ear had nearly ceased and was slight from the wound. The subsequent treatment consisted merely in syringing the ear with weak permanganate solution, in the daily probing of the wound to insure drainage, and in general treatment in the way of diet and simple tonics.

March 26th, patient discharged, with the ear dry and wound healed.

Case IV.—Boy, 14 years of age, strong and well developed. Three weeks since, as the result of measles, he had, while away from home at school, an acute suppurative inflammation of the left ear. This had resulted in implication of the mastoid, and when seen, March 17th, 1891, there was a free muco-purulent discharge from the left ear, and considerable swelling, especially over the posterior portion of the mastoid surface, including the region of the digastric fossa: the swelling was principally œdematous, but at the point last mentioned there was marked fluctuation and, correspondingly, indication of spontaneous perforation at this point; the pain in and tenderness of the mastoid region were considerable and the temperature was 101.2°. Under these conditions immediate operation under ether was decided upon, the first step, as usual, being a free incision in the posterior superior portion of the membrana tympani, following the curve of its periphery. The

incision behind the ear was made rather longer than usual in ordinary cases, and was carried backward in its lower portion very nearly to the limit of the mastoid outline, in order to include the point of greatest swelling and probable spontaneous opening, and to permit entrance into the mastoid from below, should that seem necessary. This incision liberated at the point of fluctuation, previously mentioned, one drachm of pus. The soft parts were very much swollen and firm, and but for the length of the incision would have rendered retraction and a clear field for operation difficult of accomplishment. The bone, which was found to be oozing freely, especially in the neighborhood of a minute sinus, just above the upper limit of the digastric fossa, was perforated by the small and then by the large drill, and this opening was considerably enlarged both upward and forward wherever the cortex was found to be soft, the use of the drill and chisel being followed up by small and large sharp spoons until there was no further evidence of diseased bone remaining as appreciable by either spoon or probe: the operation included the establishment of a free passage through the antrum, and syringing through from the wound to the ear was freely accomplished. The temperature the day after the operation was normal, and the patient was free from pain. The subsequent treatment consisted in the syringing of the ear and wound with weak permanganate solution and daily probing of the wound to insure drainage: the syringing was omitted at the end of a week, and at the end of two weeks probing was no longer necessary. The patient made a good recovery, both as to hearing and freedom from subsequent trouble as to mastoid symptoms.

Case V.—Woman, 35 years of age, married, stout, but not strong, and with a nursing baby five weeks old, was first seen in consultation March 31st, 1891.

The patient had a previous history of an acute suppurative inflammation of the middle ear of seven weeks' duration and an existing condition of considerable œdema of the posterior superior wall of the canal, and swelling and tenderness of the mastoid region, especially in the neighborhood of the digastric fossa.

She was sent at once to the New England Hospital for Women and operated upon under ether the following morning.

The opening in the membrana tympani was first enlarged and a long semi-lunar incision was then made behind the ear, extending backward at its lower end as far as the posterior mastoid outline.

The bone at this point was somewhat congested, broke down freely under the chisel and gouge, and gave exit to about one drachm of pus.

The mastoid cavity was curetted until only hard bone was felt and a stream of water could be passed freely through the mastoid antrum.

The relief afforded by the operation was considerable, and the patient, notwithstanding the general unfavorable circumstances, was discharged from the hospital April 17th, in good condition, her treatment after the operation, syringing and probing, being in the hands of Dr. Van Hoosen, to whom I am indebted for careful attention to, and the reports of, this case and one of the preceding cases.

Case VI.—Woman, 26 years of age, married. The patient had trouble with the ears for the five or six weeks preceding, with much pain and a very profuse discharge. She was delivered of a healthy child five weeks before and was still flowing when first seen, May 7th, 1891. She was anæmic and very nervous. There was no discharge from the right ear. The left canal was filled with discharge and no perforation could be seen on account of the

œdema of the walls. There was also a red, hot, non-fluctuating swelling over the mastoid and pain shooting down the neck and up over the side of the head. Operation was advised after leeching, Leiter's coil, and other means had failed to relieve the symptoms.

May 10. Operation under ether included the usual incision, followed by the escape of a considerable amount of pus. A sinus was found at about the centre of the outer table of the mastoid, at which point the drill entered the bone easily and liberated considerable pus. The operation was continued by means of the gouge, mallet, and curette, and free communication was established with the antrum and the parts were thoroughly flushed by hot water irrigation. Bleeding from the flaps was checked by means of hot sponges, as in similar cases. Dry baked dressing. Paracentesis of the posterior fold of the membrana tympani preceded the mastoid operation.

May 11. There has been no pain since the operation. When dressed there was very little discharge from the wound and none from the meatus. The wound was syringed with permanganate solution from this date.

May 20. No discharge from meatus or mastoid since last dressing, but some sloughing of the edges of the wound in consequence of the water having been too hot when used at time of operation. No syringing for several days. Iodoform to edges of wound. No bone felt for several days.

May 23. Wound of operation closed with granulations, no bone felt with probe. Canal wall slightly swollen; no perforation in membrana tympani. $W = \text{R } \frac{12}{60}$, L $\frac{1}{60}$.

Discharged to out-patient department Massachusetts Charitable Eye and Ear Infirmary.[1]

[1] Last seen in O. P. D. about middle of June. $W = \frac{60}{60}$ right ear; $\frac{20}{60}$ left ear. Hearing was steadily improving but patient did not return again.

Case VII.—Man, 30 years of age. Short, stout, and florid; moderate smoker and occasional drinker.

November 10, 1890. Patient first seen in consultation with a local practitioner. There was from the left ear free purulent discharge, which came through a nipple-shaped opening in the posterior superior portion of the membrana tympani. The degree of swelling of the tympanic mucous membrane and the œdema of the canal indicated the advisability of a free incision in the drumhead; this was accordingly done and supplemented by divisions of the swollen mucous membrane, upward and backward.

The incision was subsequently repeated with good results, and the discharge from the ear nearly ceased, but on April 4th, 1891, the patient reappeared with free muco-purulent discharge, considerable swelling of the canal, and swelling, redness, and tenderness of the mastoid, with, at one point, over its centre and backward, evidence of fluctuation; the pain, which had been considerable for two days and was referred principally to the mastoid region, having however decreased within twenty-four hours. Temperature was 101.8°. Local symptoms indicated spontaneous perforation of the cortex, and an operation was decided on for the following day.

April 5. Operation, under ether. Patient etherized badly, and there was, consequently, much venous oozing from the swollen and engorged tissues, which prolonged the operation. The bone was found to be softened for a considerable distance about the small opening, through which the pus had made its exit, and broke down readily under the use of the gouge, and even under the knife at the first incision; the cavity of the mastoid, which was filled with pus, needed to be very completely curetted out, both backward and downward, as well as in the direction of the mastoid antrum. Syringing through from the wound to the ear was effected in this case, as in many

others of a similar class, only under considerable pressure, on account of the swelling of the mucous membrane in the tympanum, and despite the very free incision made through the membrana tympani, as usual, as a first step of the operation.

Subsequent treatment consisted in the usual probing for maintenance of drainage and in syringing with permanganate solution, and the superficial use of dry baked dressings: the only other treatment required being attention to diet and the occasional administration of a cathartic, as the patient slept well without opiates the night after the operation, had no subsequent pain except at the time of dressing, and returned home at the end of ten days with the ear completely, and the wound all but superficially, healed.

Case VIII. — Boy, 4 years of age, slender, but well nourished. First seen April 9th, 1891, in consultation with his father, who was a physician. There was a free muco-purulent discharge from the left ear, much œdematous swelling over and behind the mastoid, and a history of pain in the mastoid region beginning five days previously. Operation was evidently demanded, and performed under ether the same afternoon, and included, in addition to the enlargement of the opening in the membrana tympani, an incision something more than one inch in length through the region of the greatest mastoid swelling. The outer surface of the mastoid gave no evidence of an attempt at spontaneous perforation beyond slight oozing at the upper portion of the exposed bone under examination with a steel probe; this point, therefore, was chosen for opening with the drill, subsequent enlargement downward with the chisel, if necessary, being easily provided for. No pus was found until the antrum was reached, and then only a few drops, but the passage through the mastoid cells and the process of reaching the

antrum showed the bone to be considerably softened and readily breaking down; a sharp spoon, therefore, was freely used through the opening in the cortex, enlarged by means of the chisel for the purpose, and all crumbling, and a few pieces of loose bone, removed down to a smooth surface. Subsequent treatment consisted in probing and syringing as in the cases previously mentioned, and the child progressed favorably, with a closure of the wound some time within four weeks after the operation, the exact date not being known, as the child had recovered sufficiently at the end of a week to be taken home.

Case IX.—Man, 56 years of age. This patient was first seen in consultation June 16th, 1891, with acute inflammation of the right middle ear and with a mucopurulent discharge through a perforation in the posterior superior segment of the membrana tympani; the discharge was free and the previous pain in the ear had ceased with this occurrence; there was no mastoid tenderness, and the patient was improving in general condition from the consequences of an attack of la grippe. Upon syringing with weak bi-carbonate solution, the discharge from the ear decreased, and finally ceased, during a convalescent trip to Norfolk., Va., upon his return from which the ear was found to be clear, dry, with the perforation healed and hearing improved.

The patient again left the city for a visit to New Haven, and while there, had renewal of the pain in the ear, extending into the mastoid, was very kindly seen by Dr. Carmalt, and subsequently returned to Boston and was again examined, July 17th.

The right membrana tympani appeared clear, except for a slight reddish tinge showing through the posterior superior portion, and the hearing was somewhat better

than when last seen: over the centre and upper portion of the mastoid was a deep-seated, tense, fluctuating swelling. The pain for the two previous nights had been severe and the temperature was 99.8°.

Operation upon the mastoid was advised and was done under ether on the afternoon of the following day, the first step being a semi-lunar incision in the membrana tympani, running from the short process downward and backward to below the median horizontal line.

The incision behind the ear followed the curve of the auricle from the line of its upper margin to the tip of the mastoid: neither ligatures nor forceps were required, broad retractors and sponging with very hot water being sufficient to control the bleeding, as in the majority of cases. From the upper end of the cut, about one-half drachm of pus escaped, and here was found a small, rough depression of the bone, which, below this point, was firm, hard, and clear.

Careful searching of the rough depression by means of a fine probe and explorer failed to reveal any sinus opening into the mastoid, but the symptoms and conditions pointed so conclusively to the existence of some such opening, however microscopic, and recalled the experience of presumably similar cases where a sinus from the upper portion of the mastoid had been traced downward and inward, that the opening was made with a drill in this case also, about one-half inch below this rough spot.

The opening made with a small and large drill passed through firm bone and was enlarged upward in the cortex by means of the chisel and mallet, the soft bone searched for being found only when close into the antrum.

The operation, which was unusually long, lasted one hour, and was concluded by dry dressing without syringing.

July 19th. Patient slept well; temperature 88.9°; pulse

66; no pain, soreness about the wound only; syringing the ear and through the wound into the ear with corrosive sublimate solution brought away some pus, a little blood, and such masses of desquammated epithelium as might come from an epithelial plug in the antrum.

July 20th. Less discharge from the ear, slight from the wound, free drainage, temperature normal, no pain.

July 21st. No discharge from the ear, still less from the wound.

July 22d. Ear dry and perforation healed, wound behind the ear rapidly closing in from the bottom.

July 26th. Patient discharged; no further probing necessary.

This, and the following case, are especially fortunate in illustrating the value of free incision of the membrana tympani in such position as to afford the best opportunity for drainage from the antrum in one direction, and of the very free and complete curetting of the mastoid cavity, which makes a similar provision in the other.

This having been provided, the use of the probe, and, for a time, of the syringe, daily, to a sufficient extent to ensure the maintenance of the drainage (a method of dressing which need not be painful or harassing to the patient), is as a rule all that is subsequently necessary.

In the following case, as will be seen, an accidental occurrence suggests the possibility of abandonment, at a much earlier period than might otherwise seem advisable, of the probing and syringing after operation.

Case X. — Man, 30 years of age. Musician. Slender, of nervous temperament. Had, after a prolonged period of over-strain from work and exposure to cold, an acute congestion of the right middle ear, characteristic in the character of its onset and the severity of its symptoms, of those acute congestions in which there is a suspense of vaso-motor inhibition as the intrinsic cause.

The membrana tympani was clear, transparent, congested at its posterior superior periphery, and somewhat œdematous in the same region, below which could be seen the pinkish color of the injected tympanic mucous membrane; there were the usual symptoms of the sense of fullness, impairment of hearing, tinnitus aurium, and pain in the middle ear, extending forward and upward: this pain was only partially relieved by an incision through the swollen parts of the membrana tympani and the free serosanguinolent discharge which followed and which was encouraged by the use of dry drainage wicks.

The serous discharge continued for several days, the pain gradually decreasing until, a muco-purulent discharge having been fairly established with a nipple-like projection at the point of incision, pain in the ear recurred with some severity, and was referred not only to the ear but also to the mastoid region.

An incision of the nipple gave partial and temporary relief, and was repeated, but the mastoid symptoms—especially localization of the pain and tenderness, and a slight blush over the spot corresponding to the position of the antrum—continuing, together with a rise of temperature and extension of pain to the vertex, a mastoid operation was evidently decidedly advisable.

February 24th, 1891. Under ether a free semi-lunar incision was made in the right membrana tympani, a further cut with a curved spatula knife being carried upward toward the antrum, dividing the swollen folds of mucous membrane.

The incision over the mastoid one-half inch back of the auricle, and one and one-fourth inches long, revealed clear, firm bone, with the exception of a small reddish area toward the upper and anterior portion of the mastoid.

An opening made with a small and then a large drill, one-fourth of an inch below this point, was enlarged

upward with the chisel and carried inward by means of the sharp spoon, supplemented by careful use of the drill.

No pus was found until the antrum was reached, although there were evidences in the portion of the mastoid traversed, of softening of the bone to an extent which required very free curetting of that cavity.

After operation, syringing with corrosive sublimate and, subsequently, with weak permanganate solution, passed freely through between the ear and wound, and the drainage of the latter was further assured by daily probing.

On the fourth day after the operation, however, when the case was progressing most favorably in all respects, even the use of the probe was put a stop to by the supervention of the accident alluded to; namely, the appearance of a slight erysipelatous blush in the right parietal region, accompanied by rise of temperature, slight chilliness, and other usual concomitant symptoms.

At the end of twenty-four hours the erysipelatous inflammation had spread over the mastoid and right ear, and was beginning to invade the temporal region and face; probing of the wound or any meddling with it being inadvisable, especially since it was dry and clean, weak corrosive sublimate dressings were continued and attention directed to the requisite general treatment of the patient.

At the time of the appearance of the erysipelas, the wound had already begun to close satisfactorily from the bottom, there was but a minimum of discharge, the patient was entirely free from pain, and had a very nearly normal temperature. At the end of ten days, with a cessation of the active symptoms of erysipelas, the wound behind the ear had entirely healed, there was no discharge whatever from the ear itself, and the hearing was steadily improving.

At the time of the present writing, the hearing is so far

restored as to make its use for professional purposes perfectly satisfactory.

In this case, therefore, the efficacy of very complete removal of all diseased tissue was accidentally illustrated by the fact that the demand for drainage facilities was so far reduced as to give a favorable result within only three days after treatment.

Case XI. — Woman, 19 years of age, single.

May 12. This patient came to the out-patient department of the Massachusetts Charitable Eye and Ear Infirmary in January with otitis media acuta and mastoid symptoms. She made one visit then and did not appear again until May 10th, 1891. For the week previous she had great pain in and back of the ear, and entered the hospital with a red, hot, fluctuating swelling over the left mastoid, œdema of the left canal with purulent discharge. No perforation could be detected in the membrana tympani on account of the swelling in the canal. Operation was advised and accepted by the patient.

Operation under ether. The usual incision was followed by escape of pus and very free bleeding, and a sinus was found at the level of the external meatus (although the external swelling was high up). Entrance of the drill through the cortex gave free exit to pus and free communication with the antrum, which was further ensured by free curetting. Hot water irrigation followed the operation, which was preceded by free semi-lunar incision of the posterior portion of the membrana tympani.

May 20. No discharge from ear or mastoid since the second day. Slight sloughing of edges of wound from effects of hot water. Wound nearly closed.

May 23d. Condition much the same as at last note. Discharged with collodion dressing, to report in out-patient department.[1]

[1] Patient only reported to out-patient department once after discharge from the house, and was then in good condition.

Case XII. —Man, 17 years of age. A good history could not be obtained from this patient, who first had ear trouble on the steamer, coming to this country, where he landed three days before his appearance at the Infirmary. His general health was reported as good. There was purulent discharge from the right ear, the canal was swollen, and there was a large, fluctuating swelling over the right mastoid, very tender on pressure. Operation under ether was advised and done April 21, 1891. The usual incision showed the tissues to be very thick and vascular over the mastoid. The bone was opened by means of the drill, liberating pus from the cells. The gouge and mallet, followed by the curette, were also used, as the mastoid was apparently subdivided by a perpendicular wall of bone, the removal of which was necessary to effect the opening established with the antrum. Dry dressings, no drainage tube.

April 23. No pain since operation; almost no discharge from ear, from the mastoid very slight. Œdema of canal wall gone. Daily dressing.

May 1. No pain or discharge from either ear or mastoid for the last five days. No œdema of canal. The membrana tympani has a normal lustre and appearance: there remains a small sinus leading to the bone in the mastoid, but no discharge. Collodion dressing.

Discharged to out-patient department.

May 9. Wound tightly closed. *W* after catheterization $=\frac{12}{60}$. No subjective symptons. Patient never returned to out-patient department after this date.

Case XIII. —Man, 35 years of age. Has had ear trouble for four weeks previous to date (May 28, 1891), and entered the out-patient department of the Massachusetts Charitable Eye and Ear Infirmary on account of chronic suppurative otitis media, with a brawny digastric

fossa and tenderness over the mastoid, and was admitted to the house. The canal was filled with a sero-purulent discharge, there was some œdema of the canal wall, a nipple in the posterior superior portion of the membrana tympani, and the mastoid tip was tender on pressure. Ordered douche every two hours. Leiter coil, cold. One leech to mastoid.

May 30. Less pain since entrance, nipple resolving, discharge increasing. Has slept well without opiates.

June 2. Since last note, the swelling in the canal had remained about the same. In the neck it had steadily increased, until it reached a point about half way to the clavicle but was neither fluctuating nor tender. Operation under ether was advised and accepted by the patient. A very long incision was made on account of the great length of the mastoid, the drill opening was made at a point about opposite the external meatus and followed by use of the gouge and curette, and a considerable quantity of pus was found in the cells. In this case also the mastoid was apparently subdivided by a bony partition which had to be removed before communication could be established with the antrum. The nipple in the membrana tympani was freely incised before the mastoid was opened.

June 6. No pain since the operation and no discharge from the mastoid wound since the day following it. The wound was kept open by daily probing, and was not syringed. The discharge from the canal decreased and the nipple resolved. Temperature normal.

June 12. The membrana tympani was clear and there was no discharge from ear or mastoid.

June 15. Slight muco-purulent discharge from ear; wound dry and nearly healed.[1]

[1] Last seen in out-patient department about middle of July; membrana tympani clear and transparent, except at lower posterior segment, where there is the scar of the old perforation. $W=\frac{2}{60}$ and hearing steadily improving.

Case XIV.—Man, 52 years of age. The left ear first began to trouble the patient when at sea four weeks since (May 23, 1891). He had two chills, violent pain in the ear, not relieved by the occurrence of discharge, and was unable to do his work. Paracentesis of the membrana tympani and leeches to the mastoid failed to give relief and on May 23 he had more pain, mastoid tenderness without redness or swelling except on the posterior wall of the canal, and a pulse of 100 and temperature of 99.8°. A Leiter coil was ordered and hot douche every two hours, also opiates as needed.

May 24. Had a chill during the night, and rise of temperature to 103.5°, with complaint of great pain in the head, the pulse was 56, strong and full, other symptoms as before. The left pupil was slightly larger than the right, but both reacted well. On account of pain and the chill, immediate operation under ether was advised and accepted by the patient.

The usual incision showed the mastoid cortex to be firm and clear but the drill released a few drops of pus, which came out apparently under great pressure. The cortex was very thick and the chisel was freely used, especially as this mastoid was also divided by a vertical wall, which was by this means broken down and free communication established with the antrum. In this case, as in the previous cases, the curetting constituted the second stage of the operation. Hot water irrigation. Dry dressing. Free incision of membrana tympani before operation.

May 26. The patient's condition was much the same as before the operation, except that the pain behind the ear was less. Left pupil not so large as before, pulse 56–64, strong and full. Daily dressing. Temperature 99°–100°; but during the night it rose to 102.5° without chill.

June 1. Wound nearly closed. Less discharge from the ear. No bone felt with the probe. Still complained of pain.

Temperature normal. Able to be up and about the ward four hours daily.

June 5. Wound firmly closed with granulations. Still complained of some pain in the left side of the head at intervals. Resolving nipple in the canal.

June 6. Some pain last night; no opiates.

June 7. Complained of pain. A sinus was discovered behind the ear which did not lead to bare bone. Syringed with permanganate solution.

June 14. Was up and about the ward. Complained of great pain at all times and that it kept him awake at night, but he has shown no outward signs of pain in the day time and certainly sleeps well at night.

July 14. Still complained of constant pain in the head. Sinus closing in slowly. No bone to be felt at bottom, slight purulent discharge. No discharge from meatus.

Discharged to out-patient department.

July 24. Pain is reported to have increased last night; this morning paracentesis of the membrana tympani liberated bloody serum. The sinus remains the same as before.

July 30. Sinus as before. No pain at all for last two days.[1]

Case XV.—Man, 50 years of age, tall, slender, and showing evidences of overwork and poor health. The patient reports a past history which confirms these appearances and, furthermore, that in April last he had severe pain in the right ear, followed by discharge. During the last week in June he reported at the aural out-patient department with tenderness over the mastoid and tragus and with a nipple on the membrana tympani; he was relieved by leeches and incision of the nipple, but on July 4th he

[1]Seen in out-patient department once in August. Sinus closing in, no discharge from meatus. Complains of pain in temporal region. Has been at work since discharge from the house.

was much disturbed by the noise in the street, which gave him a peculiar sense of discomfort in the ear, followed by nausea and vomiting. These symptoms continued to increase until he was unable to move his head upon the pillow without exciting vomiting, and as the pain in the head and the mastoid tenderness also increased, an operation under ether was decided upon and performed July 7th, 1891, consisting of the usual longitudinal incision and drilling of the firm cortex, followed by curetting upward and forward into the antrum; the nipple in the membrana tympani having been previously incised, a free passage for irrigating fluid was provided from wound to ear. Dry baked dressing; no tube or sutures.

July 8. Pain, nausea, and vertigo much relieved, discharge from ear less.

July 10. Mastoid wound granulating well from bottom.

July 12. Able to sit up; no pain; no nausea; slight vertigo and tinnitus only.

July 16. No discharge from either wound or mastoid.

August 1. Has been kept as house patient on account of general weakness and slight vertigo. Discharged to out-patient department.

Case XVI.—Boy, 16 years of age. For ten days the patient has had constant pain in his left ear and has for four days been seen in the out-patient department. Was admitted to the house June 5th, 1891. Mastoid had a constant tender spot over the spot corresponding to the antrum, with free discharge from the ear and swollen canal. Temperature 101.2°. Ordered Leiter coil and douche of warm water every two hours to the canal.

June 6. Passed a good night; slept five hours. Temperature this morning 99°; last night, 102°. Still had a tender mastoid. Operation was advised, and accepted through an interpreter by a brother of the patient.

Ether. Usual incision, gouge, chisel, and curette. Extensive caries of mastoid and of posterior wall of the canal. Nearly the whole of the posterior wall of the canal was removed and the mastoid cavity curetted as thoroughly as possible. Dry dressing.

June 7. Much discharge from the ear and mastoid. Pus very fœtid. Dressing with permanganate syringing twice daily.

June 9. Up and about the ward. Wound clean and granulating in well. Discharge very fœtid.

June 12. Canal swollen, granulations in middle ear, discharge from ear and mastoid diminishing.

June 19. Wound nearly closed.

June 25. Wound firmly closed. Some swelling of the canal and profuse fœtid discharge. Syringe four times daily.

June 27. Condition the same. Discharged to out-patient department.[1]

Case XVII.—Girl, 18 years of age. The patient was first seen June 13th, with a history of otitis media acuta of the right ear in March last, and of discharge from the ear ever since. Two weeks ago she also had pain in the mastoid extending over the side of the head, and has entered for operation.

Operation. Ether. Pus came through under the knife. Outer walls thin. Chisel, gouge, and spoon removed all carious matter and opened through the posterior inner wall. Hot water irrigation, baked dressing. Operation was of forty minutes' duration. A long curved incision of the membrana tympani posteriorly was made before the mastoid operation.

[1] Aug. 27. Still had discharge from meatus. Stump of small polyp which was snared about August 1st. No mastoid symptoms since discharge. Otorrhœa no longer fœtid. Syringe once daily.

June 17. Discharge from the ear very slight, from the wound practically none.

June 20. Wound thoroughly granulated in, no bone felt, slight discharge from granulations behind the ear, no discharge from canal.

June 25. Membrana tympani clear and transparent, slightly retracted.

June 29. Discharged to out-patient department, collodion dressing to mastoid.

July 3. In out-patient department a. d. $W = \frac{24}{60}$ after catheter. V nearly normal.

July 12. Slight redness over mastoid with tenderness, relieved in one day by cold compress and catheter. No fluid in tympanum.

July 30. Treatment discontinued, good recovery.

Case XVIII.—Boy, 2 years of age. This child is well nourished, had history of ear trouble for some time past and had also had a small incision made over the mastoid by the family physician. Entered for operation June 2. The canal was filled with purulent discharge and there was œdema of the canal wall and considerable swelling over the mastoid, with a sinus, remnant of the previous incision, leading to bare bone.

Operation. Ether. Usual incision, free bleeding. The bone seemed perfectly sound except at one spot, where there was a slight, deep depression detected by the small probe, although the whole surface of the bone appeared roughened. The curette readily broke through at the spot mentioned and showed that the mastoid was a mere shell filled with very fœtid pus. The inner wall of the process was entirely removed for a considerable space, leaving the membranous wall of the sinus exposed. Free communication was established with the antrum and the wound and the ear flushed by irrigation. Dry dressing.

June 3. Free discharge of very fœtid pus from the ear

and mastoid. No pain. Dressing twice daily. Sy. ferri iodid. twice daily.

June 6. Wound granulating in quite rapidly. General condition good. Up and about ward.

June 12. Free discharge from ear and through mastoid.

June 19. Dressing once daily. Discharge much less. Slight amount of bare bone.

July 2. Condition same. Wound probed once daily.

July 25. Much less discharge from ear and wound, and less offensive.

August 8. Mastoid wound closed in.

Case XIX.—Boy, 2½ years of age. The following case illustrates the inefficiency of the simple Wilde's incision in cases of this class and is reported in full from the records of the aural department of the Massachusetts Charitable Eye and Ear Infirmary, where it was admitted May 12, with the following history:

"The left ear has discharged for a long time, and has been treated by a general practitioner. The patient came to the out-patient department with profuse purulent, offensive discharge, filling the left canal, large swelling over the mastoid, and paresis of the left facial nerve; was very anæmic and had a rising temperature. On account of the serious condition, immediate operation was advised, and performed under ether by Dr. F. L. Jack, assistant aural surgeon in Dr. Blake's service. The usual incision was followed by the escape of much pus, accompanied by free bleeding, and further exploration showed a large carious sinus involving almost the whole mastoid process. This was freely curetted in all directions and then syringed with permanganate solution, a drainage tube inserted, and dry dressing applied.

"May 20. Rallied well from the operation, and has had daily dressing since. Did well until within two days, when nausea, vomiting, and diarrhœa developed, with

temperature of 103° and intermitting pulse. Facial paresis better.

"May 25. Condition better. Very free, somewhat offensive discharge from the ear and mastoid. Permanganate syringing passes freely from the mastoid to the meatus. Dressing twice daily.

"June 2. General condition improved. Wound closing in; still very free, offensive discharge. Very little bone felt with the probe. Dressing twice daily.

"June 8. General condition improved, ear as at last note. Goes out of doors every pleasant day.

"In the interval between June 8 and June 29 the discharge from the ear increased with the appearance of a polypus springing from the posterior portion of the tympanum, which was repeatedly snared until July 29, when, on account of increase of the discharge and its very fœtid character, together with the fact that abundant bare bone could be felt forward in the mastoid and that the recurrence of the polyp in the region of the antrum persisted, a secondary operation was thought advisable and was performed under ether on the latter date by Dr. Blake. The external canal was found to be nearly filled by a polypus springing from posterior inferior wall of the tympanum, below a spot of necrosed bone leading up toward the antrum. The fistulous opening behind the ear was enlarged by the knife, upward and downward, and division of the cicatricial tissue within the mastoid was effected by the narrow knife, followed by free curetting downward and forward in the direction of the mastoid antrum, and upward where the incision had revealed spongy necrotic bone. Two sequestra were removed, one inward and downward, the other downward and forward. The polypus was removed by means of the small sharp spoon, through external auditory canal, and the posterior portion of the bony tympanic wall was thoroughly scraped. Warm

douching resulted in free passage of water from the mastoid opening down the throat and out at the meatus. The operation lasted twenty-eight minutes and was well borne. Pulse, 130–150. Enema of milk and brandy.

"August 1. Child in good condition, temperature 99.6°. No pain. Profuse discharge from wound and meatus. Dry dressing thrice daily.

"August 3. Free drainage from mastoid through middle ear and meatus; wound showed little sign of granulating. Child up and about ward.

"August 8. Abundant discharge; otherwise as before.

"August 16. Discharge somewhat less, general condition much improved. Began to play about ward for first time since entrance.

"Sept. 7. The condition has been much the same until to-day, when persistent nausea and vomiting again set in. There was no headache and the temperature was normal until —

"Sept. 12. Temperature 99.5°, child much weaker, at times comatose, and vomiting more persistently. From this date the temperature rose slowly until —

"Sept. 14. Temperature 105°, comatose. Cheyne-Stokes breathing at times during the night, and one opisthotonic convulsion, with at times tonic spasms of whole of the right side. Died 3 P. M. No autopsy."

From the history of the preceding case, with its evidence of the establishment of a necrotic process, the progress of which could not be checked by the thoroughness of the first operation, and which rendered the second operation necessary as a forlorn hope, two inferences are permissible, — one, that the constitution of the patient was one which would have rendered any surgical interference nugatory when the suppurative process had once been established, and the other, that, had the surgical interference in

the very beginning been as thorough as it should have been and the mastoid operation subsequently performed by Dr. Jack been done in place of the simple superficial opening, the final result might have been different.

The two following cases also bear evidence of the importance of early operation, and both illustrate the consequences of extension of the suppurative process downward from the tip of the mastoid.

Case XX.—Woman, 46 years of age, single. This patient was admitted to the Infirmary Jan. 28th, having had an acute inflammation of the right middle ear, with mastoid symptoms, for about two weeks previously. The mastoid was red and tender, the canal clear. There was a perforation in the posterior inferior segment of the membrana tympani and a sero-purulent discharge.

The mastoid symptoms disappeared under leeching, douching, and cold applications, but returned again three weeks later, together with an enlargement of the glands on the right side of the neck, which latter condition pertained at the time of my first examination of the case, April 4th.

The canal was somewhat closed by œdematous swelling, there was no perforation of the membrana tympani visible on this account, and there was a very profuse purulent discharge. The mastoid was tender only on deep pressure and there was a large brawny swelling in the region of the digastric fossa extending down into the neck.

From the history of the case and the present discomfort of the patient, operation under ether was advised, consented to, and performed the same afternoon.

With the long persistence of the mastoid disease it was to be expected that the bone would be found to give evidence of the prolonged inflammatory process to which it had been subject, as was found to be the case.

The parts having been shaved and scrubbed and the rubber head band having been applied, an incision about four inches in length was made rather far back over the right mastoid. The tissues, which were thickened and very vascular, were retracted and the bone exposed, revealing roughness over nearly the whole mastoid outer surface, with a small penetrating sinus about the level of the centre of the meatus. This sinus was enlarged with the drill and a large opening then made with the gouge and chisel, giving vent to a considerable amount of pus from the cell spaces of the mastoid. By means of sharp spoons, following a probe, a free opening was established with the tympanum, so that fluid could be syringed from the meatus through the mastoid opening.

August 5. Patient weak but much better than before the operation. Very much less pain. Wound dressed daily.

April 13. Sat up nearly all day. No swelling of neck for several days past. Mastoid opening granulating. Dressing daily.

May 24. Condition during the interval of record has been much the same as before until last night, when the swelling of the neck suddenly reappeared without pain or rise of temperature. For some time past a sequestrum had been felt in the mastoid and this had been curetted without ether. A secondary operation was advised, on account of the further extension of the necrotic process.

Under ether a long cut was made near the scar of the first operation, with very little bleeding. The tissues were retracted and with gouge and mallet a large opening was made in the mastoid and the diseased bone was thoroughly curetted out. Much carious bone was found in all directions but especially toward the tip of the mastoid, the greater part of which portion of the process was removed.

June 1. Ends of wound closed in; mastoid granulating. Very free discharge, daily dressing.

June 7. Mastoid granulating quite rapidly. Very slight pain in forehead.

June 15. Syringing fluid will not pass from the mastoid to the meatus.

June 29. Mastoid wound nearly granulated. Very slight amount of bare bone to be felt.

July 7. Condition about the same. Middle ear syringe used twice daily. Discharge from mastoid slight.

July 18. Wound firmly closed in, tissues movable over mastoid. Discharge from ear much less. Syringing of ear thrice daily.

July 20. Perforation in the membrana tympani forward of the malleus and in about the middle of the membrane was enlarged by paracentesis in order to secure a better drainage. Discharge from ear less, and patient free from pain.[1]

Case XXI. — Woman, 52 years of age, married. This patient was admitted to the Infirmary May 23d, but had been seen four days previously at her home in the suburbs by the Aural Interne, Dr. E. A. Crockett, at my request. She had pain in the right ear, followed by slight discharge, eight weeks previously. The pain in the ear and the discharge soon ceased but the pain in the mastoid continued and four weeks later she began to have swelling in the neck and an increase of pain, but no chills. When seen she was in fairly good general condition, thin, active, and energetic, with a fair appetite and able to be about the house. She had a temperature of 100° and a pulse of 80. The right membrana tympani was clearly visible, and was somewhat opaque but not sufficiently so to prevent visible evidence of fluid in the middle ear: there was no swelling

[1] July 25. Discharged to out-patient department with the mastoid wound closed and only slight discharge from the ear. One week later the opening in the membrana tympani had closed.

in the canal. Paracentesis of the membrana tympani in the posterior inferior segment gave exit to a few drops of limpid serum.

The mastoid was tender at the tip only, and there was a hot, non-fluctuating swelling extending from the tip of the mastoid half way to the clavicle. A leech was applied over the mastoid, followed by cold applications, which relieved the pain, but the swelling continued to increase and the patient was admitted to the Infirmary on the date above mentioned for operation under ether, which was done on the following day. The history of the case and the deep seat of the swelling in the neck seemed to indicate spontaneous perforation of the mastoid at the inner side of the tip, or low down in the digastric fossa, with burrowing of pus below the fascia, and under these conditions an opening terminating far back, at its lower portion, would be advisable.

May 24. After the usual preliminaries, an incision was made from a point above the upper limit of the auricle, downward and backward over the line of the digastric fossa, and then curved slightly forward. At the lower part of the incision in the digastric fossa, and at the tip of the mastoid, bare bone was found and the drill was entered at this point and carried upward and forward, with the escape of but a small amount of pus, the major part of the secretion in the mastoid having evidently already drained itself down into the neck. The drill was followed by the use of the chisel and sharp spoon until a communication with the antrum had been established and the diseased bone at the tip and back of the mastoid had also been removed, which having been effected, attention was next turned to the condition of the neck.

Here an incision was first made along the anterior border of the sterno-cleido-mastoid at a point about equi-distant between the tip of the mastoid and the clavicle and a simi-

lar opening on the posterior border of the muscle and a little higher up: these openings gave exit to from five to six drachms of pus, and were then enlarged so that the finger and a spoon could be passed in all directions between the three openings and the pus cavity thoroughly scraped, undue interference downward being carefully avoided. Pus and the injected fluids passed freely through the openings in both directions. The sinus from the mastoid opening to both the lower incisions was well dilated, and flushed with a 1–5,000 corrosive solution, and medium size rubber drainage tubes were introduced. Dry dressing. Duration of operation one hour and a quarter.

May 26. Better, no pain, no stiffness in neck, normal temperature, free drainage.

May 30. Large tubes removed and replaced with smaller by inserting the ends of the smaller tubes in the upper ends of the larger, fastening them by a single catgut suture, and drawing them through.

June 5. Improving; catgut drains, previously soaked in tannin solution, inserted in place of the tubes, in the same manner.

June 12. Catgut drains came away, free drainage. Discharged under care of her family physician.

June 26. The patient was readmitted to the Infirmary with pus burrowing in the neck below the two lower openings. On account of the evident tendency of the pus to burrow downward, an operation for drainage at a lower level and for general improvement of the condition of the pus cavity was advised and done under ether on the day but one following.

June 28. Under the usual preliminary precautions, the upper and lower anterior drainage openings were enlarged and a new opening made midway between the two lower openings and an inch or more below both of them, adhesions were broken up, the cavity carefully explored and

the pyogenic membrane scraped away, so that a permanganate solution passed freely from all the openings under very slight pressure: the tissues below the lower opening were perfectly firm. No drainage tubes, dry dressings.

Following this second operation, the patient complained of shoulder tip pain but this was at no time severe and she steadily improved under simple permanganate solution syringing until —

July 4. There was considerable suppurative discharge for the first time since the operation, coming apparently from a sinus above and behind the posterior drainage opening. This was successfully controlled by pressure pads and the case progressed favorably.

Case XXII. — Woman, 19 years of age, single. In the following record of a secondary operation it should be mentioned that the original operation had been done a year before for extensive and rapidly progressing mastoid disease and that the patient had made a good recovery with the exception of a slight continuous purulent discharge from the posterior portion of the middle ear and, recently, indications of facial paralysis. A small sinus remained, and there was a tract of rough bone in region of the antrum to be felt with a probe in the middle ear. Entered the house for operation under ether, July 25th.

July 25. Following the usual incision and reopening of the mastoid, the road to the antrum was found to be blocked by cicatricial tissue, which was first cut with the small knife. Careful examination showed extensive bare and carious bone about the antrum. This was removed by the sharp spoon and by small middle ear curettes, as also some hard spiculæ of bone at the bottom of the mastoid, and drainage was established from the mastoid to the middle ear.

July 26. Patient rallied from ether slowly, was very

drowsy, had persistent vomiting, and no appetite. There was complete paralysis of the left side of the face and considerable vertigo.

July 27. The patient was still drowsy but the vomiting was checked; the dizziness, however, continued and the patient was unable to sit up.

July 28. General condition better; not drowsy; dizziness less; able to eat liquid food; eye could be closed better and mouth controlled so that liquids would not run out. Slight serous discharge from mastoid and meatus. Dressed twice daily and syringing fluid passed through freely after probing.

July 29. Facial symptoms better. Swelling of the posterior superior wall and a small polypus in the canal.[1]

The value of conclusive operative interference in the early stages of mastoid disease is as well illustrated in the following case as in those of speedily successful results which have preceded it in this report, and the recurrence of the mastoid symptoms, with the necessity for operation upon that cavity after an apparent recovery, not only points the moral which is the text for this communication but also that enunciated by Schwartze[2] in regard to distrusting a mastoid recovery so long as any suppurative process in the middle ear remains or is imminent.

Case XXIII.—Woman, 32 years of age, single. May 14, 1891. Following an acute inflammation of the right middle ear of five weeks' duration, with very profuse serous discharge, the patient had, when first seen, pain and swelling over the mastoid of three days' duration. Examination showed tenderness of the tragus and mastoid, the latter being especially sensitive over the region of the antrum and back-

[1] Subsequent history showed a gradual improvement in the facial symptoms and the swelling in the canal and the polypoid swelling also disappeared.

[2] Archiv für Ohrenheilkunde Bd. xvii. H. i. p. 116, 1881.

ward. The canal was filled with purulent discharge and there was great œdema of the posterior wall, to such an extent that the membrana tympani could not be seen. Ordered Leiter coil to mastoid region and syringing the ear every hour; two leeches were also applied to the mastoid and one to the tragus.

May 17. Still pain in the neck, tenderness of the mastoid, and profuse discharge from the ear. On account of continuance of the mastoid symptoms, operation under ether was advised. On examination, after thorough syringing, the œdema of the walls was found to be entirely gone and the membrana tympani could be clearly seen. A long incision was therefore made from the lower segment to a point above the short process and through the posterior fold, including a cut through œdematous mucous membrane which was nearly two millimeters thick. This was followed by free bleeding and serous discharge. Drainage wicks every hour.

May 23. The mastoid tenderness had gradually grown less and less since the operation, until there was but very little, and neither redness nor swelling, and the œdema of the canal had not returned. General condition was much improved.

June 3. Had been slowly convalescing since last note. Three days ago, for no ascertainable cause, temperature rose to 103°, with some nausea but no other indicative symptoms. Two days ago had more pain in the tip of the mastoid and in the right neck, which has continued since. Yesterday morning the temperature was normal. At 5 P. M. had a very severe chill, with pain in the left side and a cough which increased without expectoration. Temperature 104°, pulse 120. Respiration only slightly accelerated. Examination of the lungs and abdomen revealed nothing. One slight chill last night. This forenoon pain had gone and the cough was slight; temperature 102°.

June 5. Chill on the night of June 4th, with temperature of 104.4°, with vomiting. Some pain in the ear, much pain in the neck.

June 6. Last night had a very severe chill, temperature 104.6°. Some vomiting, but not so much as on the day before. The pain in the neck continued and there was a slight, deep-seated swelling. The external canal showed no œdema or other change and the mastoid was not tender, except at the tip. On account of the bad general condition and the mastoid tip tenderness, operation was advised and done under ether on the same day. Shaved, usual incision with but little bleeding. The drill entered the mastoid easily and one small pocket of pus was found. There was no caries of the tip and the cancellated structure there was in good condition. The opening in the cortex was enlarged with the gouge and this was followed by the use of the curette. Hot water irrigation. Dry dressings. The operation was hurried on account of the bad condition of the patient, whose pulse ranged from 140 to 180 and was irregular. Under ether about forty-five minutes. Rallied from ether slowly.

June 7. Very slight discharge from ear, none from mastoid. No pain in the neck. Complained in the morning of pain in the right eye, the first symptom of a suppurative irido-choroiditis which eventually destroyed the eye and prolonged the stay of the patient in the Infirmary long after the mastoid was healed.[1]

In contrast to these operative cases there are here appended short reports of the seven remaining mastoid cases in which operation was not necessary.

Case I.—The patient, a man 34 years of age, had

[1] Since this case has an important bearing as illustrating the path of septic infection from the mastoid, it will be reported in full with a history of the eye complication, later.

acute inflammation of the right middle ear, beginning about three weeks before the time of his first visit, May 5th, which was made on account of recurrence of pain in the ear, extending to the mastoid and occasionally towards the vertex. There was a muco-purulent discharge from the middle ear, coming through a nipple-shaped projection in the posterior superior portion of the membrana tympani; there was also slight mastoid tenderness and a temperature of 99.6°. The patient was ordered a cocaine ear-bath, bromide of potassium internally, and cold applications over the mastoid to be continued as required. Between the date of the first visit and June 16th, when the mastoid symptoms had entirely disappeared, there were occasional recurrences of pain, relievable by local applications.

Case II.—Man, 45 years of age, had an acute inflammation of the right middle ear one month before the date of his first visit, May 23d. The external auditory canal was clear, the membrana tympani opaque and slightly reddened posteriorly and superiorly, and there was some mastoid tenderness.

The patient was given bromide of potassium internally and was ordered to rest as much as possible and to make cold applications to the mastoid. Under this treatment he improved and the pain in and tenderness of the mastoid became less, recurring, however, at irregular intervals until the latter part of June, and at all times readily controlled by cold applications.

Case III.—Woman, 31 years of age, was first seen July 5th, with acute congestion of the upper portion of the right tympanic cavity, as indicated by redness and swelling of the posterior superior portion of the membrana tympani and the inner end of the canal. The pain, which was very severe, had begun forty-eight hours before the time of the

visit and now extended towards the mastoid antrum, toward the vertex, and forward into the temporal region. There was mastoid tenderness, especially over the point corresponding to the antrum and in the region of the digastric fossa; the temperature was 100.2°. A long curved incision was made in the posterior superior portion of the membrana tympani, following the posterior fold, with a resultant free bleeding and sero-sanguinolent discharge. With the use of dry drainage wicks in the canal and cold applications to the mastoid, together with bromides internally, the congestion gradually subsided and the patient made a good, though slow, recovery.

Case IV.—A woman, —years of age, was first seen April 5th, 1891, with a history of pain in the right ear of six weeks' duration, without aural treatment. Two weeks before the date of the visit a discharge from the ear had occurred but without abatement of the pain, which had finally extended into the mastoid. There was considerable œdema of the posterior wall of the external auditory canal, which was filled with a muco-purulent discharge; there was a well marked nipple on the membrana tympani and much tenderness and some redness of the mastoid.

The treatment consisted in the application of the cold Leiter's coil and in douching the ear with a warm corrosive solution every two hours.

April 7. No pain for the past twenty-four hours, œdema of the canal wall less, tenderness of the mastoid much less. Leiter coil discontinued.

April 15. Very slight discharge from the ear, no œdema of canal wall, and the nipple had nearly disappeared. There was no tenderness of the mastoid and the general condition was much improved.

July 2. The patient, who had not been seen in the interval, reported at the Infirmary with the symptoms of chronic periostitis of the mastoid.

Case V.—A woman, 40 years of age, was admitted to the Infirmary, April 6th, 1891, with a history of severe pain in and about the right ear, together with tinnitus and deafness of three weeks' duration.

Examination showed a profuse muco-purulent discharge coming through an opening in the anterior inferior quadrant of the membrana tympani, œdema of the posterior superior canal wall, tenderness of the tragus and mastoid region, and some redness of the latter. A leech was applied to the tragus and the cold Leiter coil to the mastoid.

April 7. Tenderness of the tragus entirely, and of the mastoid region quite, gone, with exception of a small spot near the canal.

April 10. The œdema of the canal wall had slightly increased and the use of the warm douche in the canal was ordered in addition to the Leiter coil.

April 13. Slept well all night without opiates, for the first time since the ear trouble began; the discharge from the ear had decreased and all tenderness had disappeared, and by May 1st the discharge had ceased also.

Case VI.—A woman, 30 years of age, was seen April 16, 1891, convalescent from influenza and with acute suppurative inflammation of both middle ears, which began five days previously and had now become complicated by acute mastoid trouble on both sides, with severe pain extending toward the vertex and down into the neck. There was œdema of both canals, tenderness of both mastoids, and a temperature of 102.5°.

The treatment consisted of rest in bed, the cold Leiter's coil to both mastoids, warm douching of both ears as often as once in three hours, and a leech to the left tragus.

April 17. Pain in the right mastoid nearly gone, temperature 100°.

April 18. Pain and tenderness in both mastoids nearly

gone, discharge from the ears and œdema of the canal walls very much less; temperature 99°.

The Leiter coil was omitted April 21st and five days later the patient was discharged from treatment.

Case VII.—The patient, a sailor, 32 years of age, had an acute inflammation of the left middle ear five months before the date of his visit, May 13, 1891, with discharge which had continued. For a period of four months he had, at irregular intervals, pain so severe as to keep him from sleeping. This pain had latterly increased and he was admitted to the Infirmary with the left mastoid evidently larger than the right, reddened and tender on pressure. The left external auditory canal was filled by a large fibrous polyp. This growth was removed to its base and syringing and alcohol instillations were ordered.

May 14. Mastoid region more tender, especially near the tip. The syringing and warm alcohol instillations were continued and in addition two leeches were applied to the mastoid and followed by the continuous cold Leiter coil.

May 15. No pain in the mastoid and no tenderness except at one point over the antrum.

May 23. Discharged from treatment with the left mastoid still larger than the right, but neither red nor tender.